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The evolving concept of value add in university commercialisation

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Abstract

Universities have been challenged to assess what value creation means to them against a complex backdrop of changing markets and funding priorities. In response, universities and their partners are creating new paradigms in value creation. This paper seeks to demonstrate and to celebrate the flexibility and cutting-edge approaches that have been adopted within the UK university sector.

In 2002/03, UK universities received £3.7bn funding. In London alone, the R&D spend (2002) was £1bn, of which 24 per cent was via the university sector. Through their commercialisation or technology transfer offices (TTOs), universities are charged with capturing value from their intellectual assets. Value is simply defined in the *Oxford English Dictionary* as a 'fair and adequate return' which should be the mantra for every reasonably minded university TTO. Increasingly, universities are also looking to achieve added value. 'Value add' is a more intriguing concept. In the university TTO context it is about more than a simple financial transaction. It encompasses tangibles such as access to funding for R&D, to materials and equipment or to specialist and complementary knowledge. Adding value can mean bringing new resources to bear on research projects or business methods. It can be seen in terms of achieving aims that the university alone could not facilitate such as the development of an opportunity, the bringing to market of a product, or the accessing of capital and expertise to drive forward new businesses. Added value may also be viewed in employability terms such as the direct creation of new jobs in a spin-out or collaborative programme, and in the development of staff and students well

suited to the commercial workplace as a result of their experiences while within the university. 'Value add' is also less tangible than this. It is the creation and sustaining of relationships that in the long term will deliver to all of the above and more. The way in which an institution views added value, and which aspects it chooses to secure, will depend on its objectives.

Driving academic innovation is a tripartite arrangement between the university, commerce and government. Although the innovation agenda has historically been pursued with more vigour than the UK is often given credit for, more recent government support has provided a welcome boost to strengthen and promote exploitation and knowledge transfer within science and technology. Through government innovation programmes there has been funding to the university sector of around £170m in the past six years with a commitment to a further £187 over the next three years. The government has paid much attention as to how the UK can maximise the knowledge and technology potential within universities and the public sector for economic benefit. The past 18 months have seen the publication of four complementary reports which include analyses and recommendations for capitalising on

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university innovation, particularly within the biosciences.¹⁻⁴

THE CHALLENGE OF PARTNERING WITH INDUSTRY

Research is not pursued in a vacuum. It is the starting point for further exploration and development by and with others. In order to fully unlock the potential of biomedical research it is essential to engage with the commercial sector to drive forward opportunities so that they may benefit healthcare. However, the model of simple collaboration and the licensing of early-stage technologies has been superseded (Figure 1). As the biotech industry developed and as new companies were being spun out of universities, the traditional big players, such as the pharmaceutical industry, perceived these new entrants to represent more attractive innovation partners than universities. The risk-averse culture of larger pharma demanded better developed

opportunities with more certainty of delivery and so it viewed biotech as the partner of choice. Options such as astute licensing for a platform technology, a prime example of which is the Medical Research Council (MRC) antibody humanisation technology, have become largely closed off. Where MRC has been able to secure a lively income stream (in the region of £15m, 2003/4) from non-exclusive licensing, as therapeutics come to market, such a technology would now be licensed into a start-up – and most likely as part of a package of intellectual property rights (IPR).

Thus companies are looking for more robust opportunities or validated targets, while most universities are not well placed to invest in such internal development of new opportunities. Rather they are geared towards producing high-quality cutting-edge research. Indeed the Research Assessment Exercise (RAE) specifically and systemically rewards academic excellence with block

Increasing need for validation of new opportunities

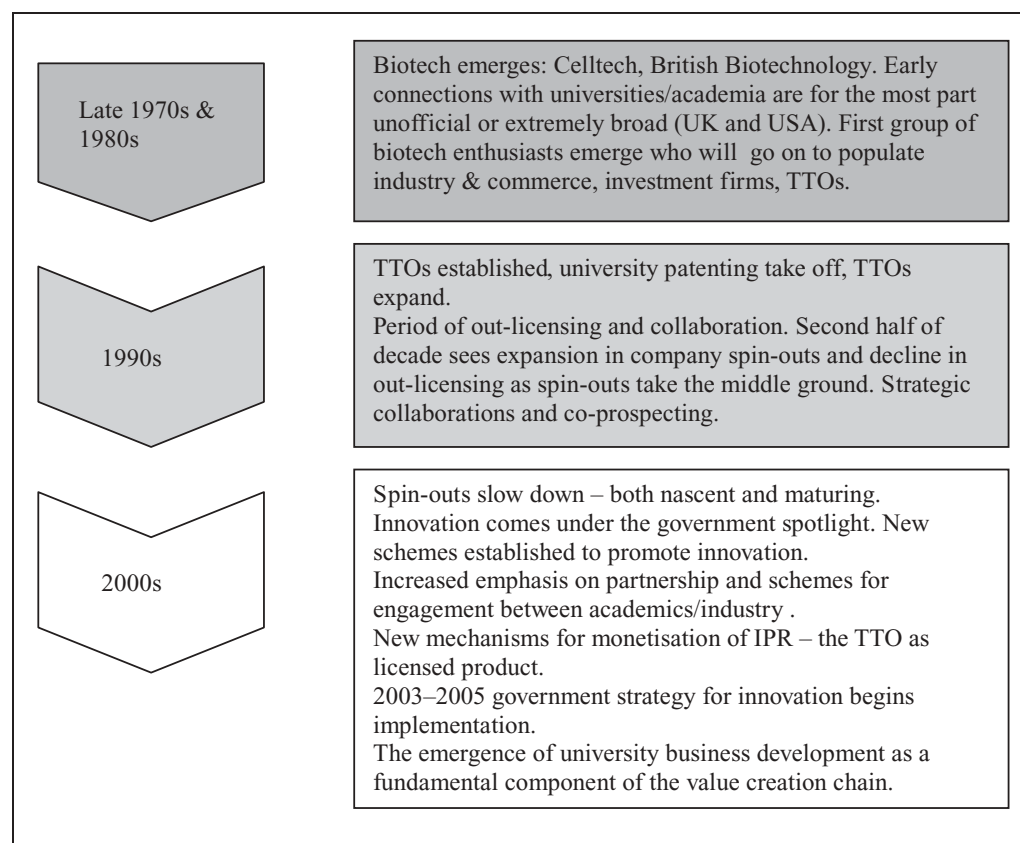


Figure 1: Maturation of technology transfer in the UK

grants of government funding which is a core source of financial support for all UK universities. However, there are certain welcome initiatives that attempt to address this gap and to add value to university research, in particular through the various proof of concept schemes.

BRIDGING THE DEVELOPMENT GAP

The most well known, and earliest to be created, is the Scottish Enterprise Proof of Concept Fund which was started in 1999. Taking a pragmatic approach, the Fund is not looking for early wins, recognising that it will take several years before it is able to fully and effectively evaluate the impact of the programme in assisting the commercialising of academic-based technology through increased deal flow and income generation. To date, 146 projects have been supported. The total funding available is £43m, which includes £10m from the European Regional Development Fund to extend the programme to further improve the commercial potential of the most promising projects already funded under the scheme. At a national level, the MRC offers awards to investigators within its institutions through its £10m Development Gap Fund while a £3.5m cross Research Councils Follow-on Fund has made similar awards to its grant recipients.

The charitable sector has also stepped into this space. The Wellcome Trust has created a fund of around £8m for translational awards to academics and young companies to develop early stage opportunities and Strategic Awards where the Trust actively seeks opportunities in areas of strategic importance to its mission. Cancer Research UK is investing both in direct development awards and in providing expertise and infrastructure to add value to early stage opportunities by taking projects into its dedicated Development Laboratories and Drug Development office. At a university level a number of proof of concept consortia have been created through funding from

the Higher Education Innovation Fund (HEIF) programme. Each may have different models of operation and levels of funding but the mission is the same – to add value to early-stage opportunities to enable better commercialisation prospects. Support to bridge the innovation gap for early-stage opportunities should continue to be a high-priority area for government if the UK is to realise the vision in its Science and Innovation Investment Framework and build on the £3.3bn investment (by 2007/8) in UK science and technology.^{3,5}

SPIN-OUT SUCCESS

With biotech companies as a conduit for R&D, it has been natural for universities to spin-out their own biotech companies to facilitate dedicated development of early-stage opportunities. This is often the right business development choice as it can be easier to get technology developed within a focused company environment where external investment can be attracted, and for whom government investment and incentive schemes exist, than it would be to develop the technology within the university. After a burst of spin-out activity in the late 1990s, the rate of new company formation from universities appears to be stabilising. The most recent UNICO survey showed that the number of spin-out companies may be levelling out at 151 (compared with 158 in 2002 and 175 in 2001) and, pleasingly, that more than half the spin-outs created during 2003 were funded through external investment finance.⁶

It is well known that funding alone is not sufficient to allow true development of the business opportunity and that expertise is crucial. Where there is investment in experienced management there a significant step change in the value proposition. A spin-out may be considered as a development mechanism and may be creatively used to harness energy and funding for development with the ultimate goal of on-licensing. Such activity can be managed by the university TTO and is a way of deploying (and

Proof of concept funding is becoming more prevalent

Bridging the innovation gap should be a high priority for government

Rate of spin-out creation is stabilising

developing) internal skills. However, the opportunity cost of directing resources to such a venture needs careful consideration at the outset. The value of bringing in experienced management is most starkly seen within the spin-out company context.

Before founding Proximagen Neurosciences, King's College London managed a steady flow of contract research into the key professor's laboratory. Industry was attracted to his research and expertise. However, through creation of a spin-out company it proved possible to bring both business focus and enough resources to bear to engage in an acute business development programme led by an experienced spin-out management team. Formed in December 2003 with its first stage investment from IP2IPO, within a year from the initial investment there was a developed customer base, an IPR portfolio and a developing product programme that demonstrated keen growth potential to investors. In March this year the company announced its intention to list on the London Stock Exchange Alternative Investments Market (AIM) with an initial public offering (IPO) of £15m. This ambitious and aggressive strategy means that the company is now positioned to be able to deliver on development of the university's intellectual assets.

Ardana Biosciences is a more mature example of building value around expertise. Formed in 2000, the company was created to capitalise on a perceived unmet need in the reproductive healthcare market. With an agreement to access IPR and know how from the MRC Human Reproductive Sciences Unit in exchange for equity, the investors, MVM, brought in a strong and experienced Chairman and CEO. There was continued investment in the management team to support the business model and to position the company to undertake an ambitious strategy of in-licensing products and outsourcing clinical trials to create a robust product pipeline. Ardana's first product was

launched on the UK market within four years of company formation. In February 2005 the company extended its exploitation agreement with the MRC and by March the company had raised £21m through an IPO on the London Stock Exchange, demonstrating investor confidence in the company's ability to deliver products to the market and to grow in value.

SUSTAINABLE FUNDING

The challenge for sustained funding in a competitive market is an issue. By 2002, there were over 480 dedicated biotech businesses with revenue of £4bn in the UK. The UK government has explored ways in which to add value and security to early stage ventures. An interesting programme is the Small Business Research Initiative (SBRI). It is based upon the US Small Business Innovation Research Program (SBIR) in which 2.5 per cent of federal research expenditure goes to small suppliers. The scale of US federal research funding means that the size and number of grants that are available can make a significant impact in assisting young companies through their early development. In 2002 contracts and grants to the value of US\$1.2bn were awarded under SBIR. Under SBRI, the parallel UK scheme, government departments (including the research funding councils) are also required to spend 2.5 per cent of their budget on 'procuring research from industry', essentially to award research grants to small and medium enterprises (SMEs). The target is for government to invest £50m in research bought from SMEs. The US scheme also requires that 2.5 per cent of federal research expenditure goes to small suppliers.

The scale of US federal research funding means that the size and number of grants that are available can make a significant impact in assisting young companies through their early development. In 2002 contracts and grants to the value of US\$1.2bn were awarded under SBIR. There are mixed

Current IPO window sees windfalls for academic institutes

Government research funding for small businesses can make an impact

New investment partnerships are being created

views on the success of the SBIR scheme. However, where there has been success, this has been significant. In one case, an American start-up, Sangamo Biosciences, was able to use SBIR to boost its R&D capacity to complement its investment in business development and the pursuit of an aggressive IPR portfolio. Within a few years of formation, the company had a staff of around 20 in the Bay area, a customer base, a granted US patent and was in a strong enough position to acquire a UK spin-out, Gendaq Ltd, that operated in the same space. Gendaq had been formed around the same time as Sangamo but its time to secure investment and subsequent growth rate were considerably slower despite having world class science, an IPR suite and good management. Had the UK company been able to leverage its initial investment with easy to secure government funding it is possible to speculate that there might have been a reverse acquisition. However, there is added value in this example. Through investment in the UK technology by way of a spin-out company, it was possible to increase the value in the initial proposition and bring greater returns to the academic base than through a straight licensing transaction. A less apparent upside is the seeding of an innovation culture. Of the scientific staff employed in Gendaq the majority have gone on to populate the commercial biosciences community. The CEO is now heading another biotech company and the scientific founder (and CSO) has started his own company.

Spin-out failure seeds success

Traditional venture capital remains averse to early stage spin-outs

UNICO, the UK Association of University Commercialisation Offices, believes that the fact that universities are producing more 'investment ready' ventures attracting external funding is indicative of the professionalism of its commercialisation activity and the productive links that have been forged with the investment community. However, sources of external funding are difficult to secure. Investor requirements have become more stringent and traditional venture capitalists (VCs) have

been clear in stating that they are moving away from seed-stage biotech companies – virtually no VCs have invested in a university spin-out in the past two years. That trend looks likely to continue.

It is encouraging to see that as gaps open up in the value creation chain, new models to bridge the gaps are stimulated. In response to the diminishing availability of seed funding, the Government, with the Wellcome Trust and Gatsby Foundation, created the University Challenge Seed Funds (UCSF) in 1998. These inward-facing investment funds, with a total budget of £45m, have been managed in different ways but have undoubtedly provided a boost to university innovation. The simplest success models are those spin-outs such as Capsant (University of Southampton) that have been able to leverage these seed funds to raise additional money. However, not all investments have resulted in a spin-out that has gone on to secure further external investment. In the case of KWS BioTest Ltd (University of Bristol), as a result of the Challenge Fund investment the company was able to position itself to enter into a joint marketing alliance with Biodynamics. The majority of UCSF spin-outs are not yet ready for the next round of investment and partnership. It is likely that a number will become technology development vehicles, positioned for subsequent acquisition or out-licensing. This should not be viewed as a negative but rather as UCSF adding further value to university commercialisation. As importantly, real value will have been added in terms of the development of an innovation culture – scientists working towards a commercial goal, driven by investors, and within the framework of a company.

NEW INVESTMENT MODELS

A new cadre of investors is springing up to meet the gaps created as the university commercialisation sector matures. Universities are creating innovative partnerships to secure financial investment

Investor confidence in University commercialisation

and expertise to build future returns (Table 1). In 2002 Imperial College entered into two new investor relationships. The first, with Nikko, gave co-investment rights to new spin-outs. The second, with Flemming Family and Partners and Gordon House Asset Management Ltd (the latter now acquired by the former), allowed the College to monetise value in its early-stage spin-outs through the creation of a limited liability partnership that saw significant multimillion sums invested in the university. Building on its success, Imperial has just realised £10m through private placement of shares in its commercialisation company, Imperial Innovations, which raised over £20m, that was shared between the College and Innovations. The year 2002 was an active

one for technology transfer investment. The technology transfer company, BioFusion Ltd, was set up by Sheffield University. In January of this year BioFusion signed a 10 year exclusive agreement with Sheffield University to commercialise all the university-owned medical IPR. In February BioFusion listed on AIM raising £8.23m. This funding allows for the management and funding for existing and new portfolio companies within the life sciences area. The university has a shareholding in BioFusion. BioFusion has made clear its intention to develop similar relationships within the sector.

Also in 2002, IP2IPO was making its first foray into university partnership. In return for a £20m investment in the University of Oxford, IP2IPO acquired a

Table 1: External investment in university technology transfer

University	Investor	Year	Deal	Value to university
Medical Research Council	MVM	1998	First right to invest in MRC spin-outs. Five year agreement renewed for further five years. Certain % of fund to be invested in MRC companies	MVM raised two funds totalling over £140m. MRC has carried interest in MVM's profits
University of Oxford	IP2IPO	2000	IP2IPO acquired 50% interest in spin-outs and licensing income from the Department of Chemistry in a 15 year partnership	£20m invested in university. A £5m fund available for spin-out investment
Imperial College London	Nikko	2002	Co-investment rights in new Imperial spin-outs	£20m
Imperial College London	Fleming Family & Partners, Gordon House Asset Management	2002	Created limited liability partnership with 30% share in the spin out portfolio – developed and unlisted companies	'Multimillion sums' invested in university
University of Leeds	TechTran Group Ltd	2002	Company created to manage technology transfer from the university with long-term commercialisation contract. 30% interest in licensing and spin-outs	Dedicated technology transfer company
University of Southampton	IP2IPO	2002	IP2IPO acquired 20% interest in commercialisation income over 25 years	£5m investment fund plus additional benefits
King's College London	IP2IPO	2003	IP2IPO acquired 20% interest in commercialisation income over 25 years	£5m investment fund plus additional benefits
University of York	IP2IPO	2003	30% stake in Amaethon Ltd, a company created to manage technology transfer from the Centre for Novel Agricultural Products	£1.15m investment fund created
Brunel University	Close Brothers	2004	10 year agreement relating to spin-out companies from the school of Engineering and Design	£4.5m dedicated funds available from a new venture capital trust (VCT)
University of Leeds	IP2IPO	2004 2005	20% stake in TechTran Group Ltd Acquired entire shareholding in TechTran	£2m investment in TechTran £4m in cash plus shares in IP2IPO – total consideration £16.1m
University of Sheffield	BioFusion	2005	Exclusive licence to commercialise all university biomedical IPR over 10 years	University has an equity stake in BioFusion. Company listed on AIM February 2005 raising £8.23m
Imperial Innovations	Private	2005	Private placement, 29% shareholding in Imperial Innovations, the commercialisation company of Imperial College, London	Approx. £20m raised between the College and Innovations for reinvestment. 15 year pipeline between Imperial and Innovations

Sharing resources within the research community is a key role for technology transfer

Is the sector more efficient or desperate?

50 per cent interest in spin-out companies and licensing income arising from the chemistry department until 2015. Building on this relationship, IP2IPO has gone on to form another four strategic long-term partnerships with Kings College London, the University of Southampton, the University of York's Centre for Novel Agricultural Products (CNAP) and the University of Leeds. This is an alternative paradigm bringing a combination of investment, management and increased resources to the partners. The partnership allows a boost to existing and nascent academic business models through creation of companies as dedicated valuation creation vehicles to achieve returns through a variety of routes. Dedicated investment funds continue to be created. Last year saw Close Brothers' lead on raising a venture capital trust fund (VCT) for Brunel University.

This monetisation of the expertise and historic and future potential of the universities and their commercialisation offices through strategic partnerships with investors demonstrates a coming of age of UK university technology transfer. The business and investment community and government now recognise that universities and their TTOs have a real contribution to make to innovation and economic development in its broadest sense. This is set to continue as universities and TTOs play a real role in working with industry to develop the strategy and tools to support innovation. For example the participation in regional Science and Innovation Councils to develop science and technology strategy and the practical reduction to practice of a set of model framework agreements for collaboration produced by a team of university and industry representative – the Lambert Toolkit.⁷

MEASURING VALUE

There has been a great deal of focus on spin-out activity and equity realisation as a measure of innovation and value add. It is easy to quantify and could be one of the simplest metrics to achieve. It has been

argued that it is easier to establish a spin-out than it is to develop the technology.⁸ Other readily measured outputs are transactions such as licensing and contract research. Here there may be a conundrum in trying to define and measure success and value. Having set up a spin-out company as the strategic mechanism to maximise development of the opportunity, the university has a duty of care to help the company to drive towards maximising value, certainly in its early growth phase. In which case, the university might adopt a longer-term strategy of supporting a licensing pipeline or offering favourable terms for engaging in research with the company. The result will be, in the short and possibly medium term, a decrease in licensing and associated revenue and a perceived underperformance by the university TTO.

A recent analysis of university/biotech deals suggest that universities should be driving for increased income from licensees relating to the later stages of the product development cycle particularly from biotech alliances.⁹ It noted that although the average value of deals had decreased, that the time frame for completion of transactions had also decreased, both from the universities and from the biotech to alliance partners. Have these organisations become more professional and efficient or more desperate? Certainly there are still many universities without the resources for longer-term investment to allow their IPR to mature that are forced to license within first year of patent filing.

An analogous position exists for biotech – do they partner early because of value added and because they have a defined niche in the process or because they do not have the resources or finance to take the proposition to the next level? Again the early stage of university opportunities within the biotech sector influences the kinds of return that can be expected. For example, a recent analysis of the costs to bring a drug to market estimated it at US\$802m for a self-originated new chemical entity (NCE)

The conundrum of measuring success and value

Value creation relies on a complexity of activities

taking into account cost of capital.¹⁰ Set the fact that companies must make enough income and return on investment to cover the cost of drug development against the immaturity of the university invention and the potential involvement of several companies in the development and marketing pipeline. Even if the target has been validated by the university, the returns to the university will be small. However, the key for the university lies within the diversity of its portfolio.

Multiple products, partners and markets will tend to maximise returns and are consistent with the general mission for university technology transfer – to facilitate dissemination of university IPR and to maximise return. Licensing of research tools as a way of sharing resources within the research community is perhaps the most pertinent demonstration of this mission. For example, in the period from 1980 to 1997, medical invention reports from Columbia University (USA) showed that more than 50 per cent of licences executed were in respect of research tools.

Success in technology transfer should consider wider social and economic benefits

Significant value can be leveraged by way of strategic partnerships with industry. At Dundee University a collaboration with six pharmaceutical companies that started in 1998 has seen the partners commit to invest over £21.5m over a 10 year period to create the Protein Signalling Consortium. In addition to the added research capacity within the university, the partnership has created 20 new scientific posts and enabled a robust engagement with industry for both those within the Division and those within associated departments. It has seen sharing of knowledge and resources and has provided a natural licensing route for novel IPR. It is a best practice model of knowledge transfer. In that it grew from the lead professors' existing profile with industry, it is confirmation of Merton's four principles of the normative structure of science within which he defines 'property rights' as just one; the recognition by others of the scientist's

Significant value can be leveraged through strategic partnerships with industry

distinctive part in having brought the result into being.¹¹ This recognition is powerful in leveraging value add from industry: a process which in turn is cyclical – value generates value. As Professor Suzanne Sandmeyer of University of California, Irvine, reported to the University Presidents Retreat, corporate support had enhanced her chances of securing federal funding as it demonstrated the relevance of her work.¹²

There is a move away from a linear view of exploitation and innovation to a formal recognition that value creation for universities relies on a complexity of activities and is realised through a variety of routes. University commercial offices are now investing in business development strategies that weave in more subtle aspects such as management of client relationships, the creation of sector-specific industry advisory groups, work placement partnerships and bespoke training alongside the more traditional transactional activities. A significant long-term benefit of knowledge transfer, and one that is often neglected, is the provision of trained and experienced students, scientists and clinicians and their movement through the sector employers, as discussed in more detail by Gelijns and Their.¹³

How are universities to be judged on their ability to create and add value? Lambert supported the view that TT success should not be evaluated solely by economic returns to the university but should consider the wider social and economic benefits such as the exchange of knowledge.² This will be harder to measure and outcomes cannot and should not be viewed in the short term. This would suggest that more longitudinal studies are needed as is the building of a set of ongoing case studies to evaluate and appraise success.

CONCLUSION

The university innovation culture has matured. The average number of invention disclosures has increased by

more than 72 per cent per institution in 2003 compared with the previous year and licensing income has increased from £22.4m in 2002 to over £31.3m.¹⁴ There are new mechanisms to support innovation and to develop new opportunities. Financial markets have become more buoyant. Last year the USA recorded the largest number of IPOs since the internet bubble – 260 in 2004, three-fold up on 2003. The window to IPOs is opening up in the UK with several listings already this year. European investors are raising new funds after a prolonged drought. Eden Ventures has raised £32m for early-stage technology investments in UK and Ireland telecoms, media and software. UniVen is looking to raise a £20m Venture Capital Trust (VCT) to invest in IP-rich companies and in particular in university-based spin-outs.

The success and professionalism in the university sector are being recognised by the appetite to invest in university commercialisation companies. In some cases, the licensor has become the licensed product. Universities are exploring new ways to monetise their assets and to add value to business creation commercial opportunities. Although traditional licensing may be more challenging than five years ago and the number of spin-outs may have declined, there are now more creative ways to add value and to realise value in university opportunities. The notion of value itself is being reappraised. Financial return alone is no longer sufficient if universities are to view their commercial activities strategically and contextually. Long-term returns such as sustained partnership, cultural change and job creation should be anticipated alongside the shorter-term more tangible returns such as income, access to resources and expertise and programme delivery. The key, as ever, lies within flexibility and innovation within the sector.

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